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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: Patent Application of

Sung-nam Lee et al.

Application No.: 10/624,687

Filing Date: July 23, 2003

Title: SEMICONDUCTOR OPTOELECTRONIC DEVICE

Group Art Unit: 2828

Examiner: TUAN N NGUYEN

Confirmation No.: 6695

AMENDMENT/REPLY TRANSMITTAL LETTER

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed is a reply for the above-identified patent application.

☐ A Petition for Extension of Time is also enclosed.

☐ Terminal Disclaimer(s) and the ☐ \$65.00 (2814) ☐ \$130.00 (1814) fee per
Disclaimer due under 37 C.F.R. § 1.20(d) are also enclosed.

☐ Also enclosed is/are _____

☐ Small entity status is hereby claimed.

☐ Applicant(s) requests continued examination under 37 C.F.R. § 1.114 and enclose the
☐ \$395.00 (2801) ☐ \$790.00 (1801) fee due under 37 C.F.R. § 1.17(e).

☐ Applicant(s) requests that any previously unentered after final amendments not be entered.
Continued examination is requested based on the enclosed documents identified above.

☐ Applicant(s) previously submitted _____

_____ on _____
for which continued examination is requested.

☐ Applicant(s) requests suspension of action by the Office until at least _____,
which does not exceed three months from the filing of this RCE, in accordance with 37 C.F.R.
§ 1.103(c). The required fee under 37 C.F.R. § 1.17(i) is enclosed.

☐ A Request for Entry and Consideration of Submission under 37 C.F.R. § 1.129(a) (1809/2809) is also
enclosed.

- ☒ No additional claim fee is required.
- ☐ An additional claim fee is required, and is calculated as shown below.

AMENDED CLAIMS					
	No. of Claims	Highest No. of Claims Previously Paid For	Extra Claims	Rate	Additional Fee
Total Claims		MINUS =	0	x \$50.00 (1202) =	\$ 0.00
Independent Claims		MINUS =	0	x \$200.00 (1201) =	\$ 0.00
If Amendment adds multiple dependent claims, add \$360.00 (1203)					
Total Claim Amendment Fee					\$ 0.00
<input type="checkbox"/> Small Entity Status claimed - subtract 50% of Total Claim Amendment Fee					\$ 0.00
TOTAL ADDITIONAL CLAIM FEE DUE FOR THIS AMENDMENT					\$ 0.00

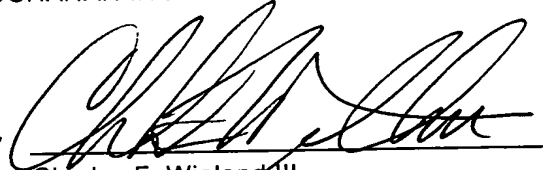
- ☐ A check in the amount of _____ is enclosed for the fee due.
- ☐ Charge _____ to Deposit Account No. 02-4800.
- ☐ Charge _____ to credit card. Form PTO-2038 is attached.

The Director is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17, 1.20(d) and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800. This paper is submitted in duplicate.

Respectfully submitted,

BUCHANAN INGERSOLL PC

By



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Date: December 14, 2005



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In re Patent Application of

Sung-nam Lee et al.

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For: SEMICONDUCTOR
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) Examiner: TUAN N NGUYEN
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) Confirmation No.: 6695
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REQUEST FOR RECONSIDERATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated September 15, 2005, Applicants respectfully request reconsideration of the above-captioned application. Claims 1-24 are currently pending. Applicants note with appreciation the indication that claims 7-9, 12-15 and 18-24 contain allowable subject matter.¹ Applicants respectfully submit that all of the pending claims are allowable, at least for the following reasons.

The Office Action includes a rejection of claims 1-6, 10, 11, 16 and 17 under 35 U.S.C. §103 as allegedly being unpatentable over Applicants' description of prior art as illustrated in Figure 1, in view of the Botez et al. patent (U.S. Patent No. 5,889,805). This rejection is respectfully traversed.

¹ It is assumed that page 4 should have also listed claims 12-15 and 18-24, as they are listed on the cover sheet to the Office Action.

As shown in Figure 1, the semiconductor nitride-based laser device includes a sapphire substrate 1, a GaN contact layer 2, an n-type cladding layer 3, an n-type waveguide layer 4, an active layer 5, an electron blocking layer 6, a p-type waveguide layer 7, a p-type cladding layer 8, and a p-GaN layer 9. In this conventional device, the $\text{Al}_x\text{Ga}_{1-x}$ and cladding layer confines electrons light is formed on the GaN active layer. The $\text{Al}_x\text{Ga}_{1-x}$ has a greater energy than GaN. In addition, a difference in refractory indices between the $\text{Al}_x\text{Ga}_{1-x}$ and the InGaN is greater than the difference in refractory indices between GaN and InGaN. This, coupled with the smaller lattice constant of the $\text{Al}_x\text{Ga}_{1-x}$ and differences in the thermal expansion coefficient may cause cracks in the nitride-base laser diode this puts limits on the composition ratio and thicknesses, as explained at pages 1 and 2 of the present application.

Embodiments of the present invention can provide a highly efficient semiconductor light emitting device capable of decreasing the level of current necessary to oscillate a laser, for instance. This is done, in part, to the provision of upper and lower optical confinement layers between the active layer and the upper waveguide layer and between the active layer and the lower waveguide layer, respectively, and having an energy gap that is smaller than those of the upper and lower waveguide layers but greater than that of the active layer.

In recognition of prior art Figure 1 not showing these aspects of the present invention, attempts to look to the Botez et al. patent with the suggestion that it discloses an active region with a confinement layer. Applicants respectfully disagree.

The Botez et al. patent discloses a "confinement layer" but first it should be noted that "optical confinement layer" and "waveguide layer" are frequently used interchangeably in the art. The "confinement layer" of the Botez et al. patent cannot be seen to correspond to the optical confinement layer as meant in the present application. The confinement layer of the Botez et al. patent is instead substantially similar to the waveguide layers 4 and 7 of prior art Figure 1.

As such, the Botez et al. patent does not teach or suggest the position and the design, or in particular the energy band gap, of the "confinement layer" recited in pending claim 1. As recited in claim 1, the optical confinement layers are placed between the waveguide and the active layers and have an energy band gap that is smaller than those of the waveguide layers but greater than the active layer. The Botez et al. patent does not provide any teachings regarding this structure, whether viewed alone or in combination with Figure 1. At best, the Botez et al patent would teach a substitute of materials for waveguide layers 4 and 7 of Figure 1, if any modification at all would have been suggested to one skilled in the art in reviewing Figure 1 against the disclosure of the Botez et al. patent.

In light of the foregoing, Applicants respectfully submit that the applied art neither teaches nor suggests the present invention in that the Botez et al. patent neither teaches nor suggests combining a waveguide layer and an optical confinement layer as recited in claim 1 of the present application. Applicants point to column 4, lines 50-56 of the Botez et al. patent in this regard.

CONCLUSION

In light of the foregoing, Applicants earnestly solicit an indication of allowance of all the pending claims. Should any residual issues exist, the Examiner is invited to contact the undersigned at the number listed below.

Respectfully submitted,

BUCHANAN INGERSOLL PC

Date: December 14, 2005

By: 

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